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ABSTRACT

This bulletin argues that by integrating academic and vocational instruction into a unified curriculum, schools can ensure that students are better prepared to meet the challenges of careers and a changing society. Vocational education provides three broad areas of skills: entry level job skills, employability skills, and employment skills. But despite the current separation of the curricula, vocational education does not exist apart from academics, and some vocational subjects require a great deal of academic skill. Therefore, integrating academic and vocational instruction into a unified curriculum is a way of better ensuring that non-college-bound students are prepared for life in a changing work world and a complex society. Four examples are described of school settings that are integrating academic and vocational instruction: Dauphin County Area Vocational Technical School in Harrisburg, Pennsylvania; Corvallis School District, Oregon; Great Oaks Joint Vocational School District in Cincinnati, Ohio; and Sandy Union High School in Sandy, Oregon. The report concludes with general recommendations for integrating academic and vocational instruction, and 12 references are included. (TE)

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Making Common Cause: Integrating Academic and Vocational Studies

By integrating academic and vocational instruction into a unified curriculum, schools can ensure that students are better prepared to meet the challenges of careers and a changing society.

There may have been a time — perhaps in the days of Washington and Jefferson — when a purely classical education prepared people for their life's role as leader or thinker.

The apprentices of the time, on the other hand, could get by quite nicely with little claim to literacy; it wasn't expected, nor did the general public necessarily possess such skills. As recently as the turn of the century, only 6 percent of the populace graduated from high school.

Today, however, someone with a graduate degree in art history might have to return to school for a degree in computer graphics in order to find a job. And the individual who has mastered occupational competencies without acquiring communication and computation skills works at the entry level with no hope of advancement and only some chance of job security.

Either/Or Outdated

The reality in today's postindustrial information/service society is that everyone needs to be prepared for employment and have at least minimal competency in the basic skills. Yet our educational system, in large part, continues to function as if students can be educated through mutually exclusive tracks.

The mental muscle developed by college-prep students is expected to prepare them for any life's course they wish to pursue. The job skills developed by vocational-technical students are expected to prepare them, once and for all, for a career.

The numerous reports associated with the "excellence movement" indicate otherwise. Educators bemoan the fact that students graduate with inadequate basic skills. Employers charge that new employees lack the ability to solve problems, make decisions, cope with change or even read, write, and compute at the levels required. And naturally everyone looks to the schools as both the cause of and the solution to the problems.

In fact, schools must change to meet changing societal needs, pressures, and priorities, and the excellence movement — heralded by the 1983 *A Nation at Risk* report — is generating a period of somewhat radical change. Unfortunately, the need for accountability has placed a great deal of emphasis on *results* and perhaps too little on *process*. Competency testing, focusing as it does on minimum standards and easily measurable skills, is surely not a sufficient solution.

More productive solutions may be found by identifying the skills that are basic to occupational and personal success and developing educational strategies that will help students prepare for the next step they will take, whether it is further education, employment, or some other option.

One strategy currently implemented in a number of schools is integrating academic and vocational education in some fashion. Although integration should cut

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both ways, providing vocational students with needed academic preparation and academic students with needed occupational preparation, in this report we will focus on the *integration of academics into the vocational curriculum.* First, let's look at the elements we will be integrating.

What Vocational Skills Are Basic?

One of the fallacies underlying many of the excellence movement reports is that vocational education is narrow, job-specific training. Were that true, its place in the secondary school curriculum would indeed be questionable. However, good vocational programs have always provided students with far more than a tool kit of simple manipulative skills to take with them to their jobs.

A good vocational program starts with an *occupational analysis* in which the competencies required for a particular job are systematically identified. Such competencies need not be narrow, however. If the job requires problem solving and troubleshooting, those competencies will surface in the analysis.

However, vocational education does not derive from occupational analysis alone. The next step is *task analysis* in which each competency is broken down into the steps, knowledge, and attitudes required to master that competency. It is from this information that vocational curricula are developed. The curriculum, then, covers not just the steps involved in performing a particular job task, but also the related knowledge — math, English, science, vocational theory — and development of the desired attitudes.

Vocational education does not exist apart from academics. Some vocational subjects require a great deal of skill in one academic area.

The typical curriculum also includes activities requiring students to apply those skills — to select from their repertoire those skills appropriate for a given task and to use them in an orchestrated way.

Another aspect of vocational education that must be considered is the *vocational student organization* (VSO). VSOs, which are an integral part of the vocational curriculum, provide students with opportunities to develop leadership skills, to work as a team, to play a role in community development, and to test their occupational skills in competitive events.

Vocational education, in short, provides three broad areas of skills:

- *Entry-level job skills.* More than entry-level skills are not, in most cases, required or even desirable. There is not time to teach more than that. Employers don't want more than that. And since skills become obsolete so quickly today, it is counterproductive to teach more than that. Retraining, perhaps five to seven times, will characterize careers of the future — lifelong learning.
- *Employability skills.* The skills needed to get a job include interviewing, conducting a job search, developing a resumé, and completing a job application form.
- *Employment skills.* The skills needed to keep a job and advance in the occupation (or move laterally if needed) include interpersonal skills, educability skills, thinking skills, problem-solving and decision-making skills, coping with change, risk taking, innovativeness, entrepreneurship, and leadership. Also included are the many affective elements desired by employers: punctuality, reliability, safety-mindedness, perseverance, cooperation, loyalty, enthusiasm, and confidence.

Academic Skills Essential to Occupational Preparation

Vocational education does not exist apart from academics. *Some* vocational subjects require a great deal of skill in one academic area. For example, English skills are an inherent part of any business/office curriculum; science principles are an inherent part of any electronics curriculum; mathematical calculations are an inherent part of any carpentry curriculum, and so on. *All* vocational subjects require a certain amount of reading, writing, speaking, listening, and computation as part of the normal instructional activities. In short, vocational students need at least three types of academic skills:

- *Common-core basic skills.* Math, science, and communication (reading, writing, speaking, and listening) skills should be included through instruction, remediation, reinforcement, and application. Computer literacy is another common-core skill that is becoming basic.
- *Job-specific basic skills.* Students training for certain occupations may require additional academic coursework.
- *Academics for the whole person.* They say there's more to life than work. More and more, day-to-day survival requires literacy. Math is a must, as we all were reminded as we tried this year to recalculate deductions according to the new IRS procedures. It is critical that those affected by the democratic process understand how to function effectively within it. Citizens must understand the nation's history to put today in perspective. An exposure to literature does in fact open doors on the world.

In theory, it is up to academic instructors to teach academic subjects. The role of vocational instructors, then, is to show how the academic skills apply to occupational tasks and to reinforce the academics within the vocational instruction. In reality, academic and vocational instructors often have too little contact to make such a coordinated approach feasible.

changing economy. After a two-year review process, the consensus was that skills in math, communications, and organization should be strengthened within each occupational area. It was also agreed that these skills should be taught by subject-matter specialists and integrated and correlated with the occupational field of study.

Accordingly, Great Oaks initiated a limited experimental program in one center in 1983 involving five vocational programs that required varying levels of math and science. The 10 teachers involved were selected because of their teaching skill, their openness to change, and their persistence. With the success of the experimental effort, the program was implemented throughout the district in the 1983-84 school year.

In implementing this integrated approach, Great Oaks made full use of the change process — securing support from each level, involving all those affected in substantive ways, and providing the time and support needed for change. They also used marketing strategies to sell the program.

District staff members were encouraged to offer suggestions, air grievances, and raise questions. Furthermore, they worked closely with their Council on Vocational Education — 24 chief executive officers from business and industry — to secure their input and involvement throughout the changeover.

Each Great Oaks campus was given a six-year transition period in which to develop the program. This allows time for the staff to accept the change, develop curriculum, work out kinks, and incorporate revisions. Since the integrated program reduces the vocational instruction time, this approach also provides time for "redundant" instructors to consider their career options.

Previously, for example, there were 12 vocational instructors and 2 academic instructors for every 6 occupational programs. Under the new system, there are 6 vocational instructors, 6 applied-academic and academic instructors, and 1 instructional coordinator for every 6 programs. To make the transition by simply dropping vocational staff could have created serious morale problem. Instead, "redundant" staff members have six years in which to retire, to find other employment, or, with help from a tuition reimbursement program, to obtain academic certification and convert to one of the applied academic or coordination positions.

The occupational and applied academics classes are all named to emphasize that they are part of a *total integrated vocational program*, e.g., Integrated Technical Foundations and Integrated Occupational Applications Laboratory. The Great Oaks staff members believe that to have a totally integrated program, learners should know that they *must* pass all these courses to earn a vocational certificate; they must be sold on the complete package.

Vocational and academic instructors work together to develop the curriculum. Involving them in the process gets them in the change mode, develops their commitment to the resulting curriculum, and helps to build academic/vocational teams. In this cooperative process, vocational instructors complete job and task analyses and then identify the math and science knowledge and skills for each duty block. Math and science specialists use that information to develop a math/science curriculum that correlates with the vocational course of study.

Time is provided for the academic and vocational teachers to work together to design strategies and develop projects integrating math/science concepts into technical applications. They also use this time to decide who will teach which part and what materials and instructional methods will be used. Time is also provided later in the developmental process for academic/vocational teams to develop learning activity guides (LAGs), teacher activity guides (TAGs), job task sheets, procedure sheets, information sheets, and so on.

This teaming, from planning through implementation, is considered essential to the integrated effort. Time for teaming does not end when the planning phase is over. During the pilot test, for example, teachers were *required* to meet for 10 minutes a day — to touch bases, compare progress, and communicate. After a few months, they made daily contact voluntarily.

The LAGs and TAGs also proved to be essential. When the vocational instructors lost instructional time, there was a certain amount of panic. One response to this was to involve the advisory committee in reviewing the competencies to be included in the program, thus ensuring that the course content was pared to the essentials but did include the essentials. Another response was to use different materials and strategies to deliver the content more efficiently. One result is that students are required to take more responsibility for their own learning. Although students didn't automatically enjoy this "benefit" and teachers found the curriculum development work strenuous, time is convincing both groups that the effort is worthwhile.

The May 1988 issue of *Smithsonian* includes an article that describes the vocational programs of the four campuses of the Great Oaks Joint Vocational School District.

SANDY UNION HIGH SCHOOL, District No. 2, 17100 Bluff Rd., Sandy, Oreg. 97055. *Contact:* Dennis W. Crow, principal

In the fall of 1984, Sandy High implemented the Environmental Science Program, an integrated science/vocational program that proved to be very successful. Subsequently, the staff members analyzed the method through which the science concepts and vocational skills had been combined and monitored, and from this prepared a detailed written process model that can serve as a blueprint for others to follow. The process model includes six steps.

First, make a commitment to involve both the people affected by the program and those whose support is needed — an involvement that should continue throughout the planning, implementation, and evaluation stages and that must be real and substantive.

clusters became the functional operational units. Each cluster is headed by a cluster manager and includes an academic team (English, math, social studies, and science). Cluster managers, who may be either vocational or academic teachers, are elected and are financially compensated for serving in that role. The term of office is three years because the costs of training for that position are substantial and the experience obtained in it is valuable enough to make annual elections neither practical nor cost-effective.

Each cluster develops its own curriculum, both academic and vocational, and vocational education dollars are used to support this effort. In the development of clusters and curriculum, the school had input from business and industry every step of the way. Each new idea was taken to the occupational advisory committees for approval, and all the curriculum, including the academic parts, must be approved by these advisory committees.

Some academic teachers had trouble adjusting to the integrated-cluster approach. Social studies teachers, for example, initially had difficulty identifying how their content could be occupational-specific. Some vocational teachers also had adjustment problems; they were reluctant to use "occupational instruction time" to provide academic instruction because they felt a strong need to teach students everything they would ever need to know occupationally. However, as the program progresses, Dauphin teachers are becoming more enthusiastic about the clustering concept.

New teachers are oriented to the cluster approach through inservice training offered as part of their induction program. In addition, all teachers come together for meetings. According to the administration, simple proximity does have its benefits.

One clear measure of the success of the program is provided by the results of the Educational Quality Assessment Test, which is administered to students in Pennsylvania three times during their school years. Students from Dauphin County AVTS are now in the 99th percentile.

CORVALLIS SCHOOL DISTRICT, 509J, Administration Building, 1555 S.W. 35th St., Corvallis, Oreg. 97333. *Contact:* Ada Fancher, curriculum coordinator

Math and vocational teachers in this district have developed a process model for integrating vocational education and math skills. The approach ensures that students receive sufficient math in a sequence of vocational courses to justify awarding them math credit. (Only one of the four math credits required for graduation can be earned in this way.)

The process model relies on three inservice workshops to prepare teachers for integration:

- In the three to four-hour *orientation* workshop, math and vocational teachers are introduced to the processes to be followed and are paired to work as integrated teams throughout the workshop. In this way, participants not only gain the information needed but also begin to work as integrated math/vocational teams.
- The second session is a one-day *workshop for validating math in vocational programs.* Once again, vocational instructors and their math counterparts work in small teams. Using a matrix, they analyze the existing vocational curriculum guide to determine the degree to which math is included. Next, they identify specific math applications in each course, a task structured by a 134-item math skills checklist that breaks math into its many concepts. On that basis, they identify course sequences that offer justification for math equivalency credit. A review committee considers these findings and makes the final approval decision based on specific established criteria.
- The final session is devoted to *professional development,* a four-hour sharing session during which each pair of teachers presents six math concepts they have selected, with each team member using his or her own approach. At the end of each team's 30-minute presentation, the large group is asked to spend 10 minutes discussing and critiquing the two approaches used (effectiveness, similarities and differences, advantages and disadvantages). Through this sharing, instructors develop mutual respect, an improved spirit of cooperation, and a better understanding of theoretical math concepts and their vocational applications.

This approach worked and continues to work because, in the view of the staff:

- there was administrative support and commitment
- academic/vocational involvement *at all levels* was provided
- the project's co-director is a member of the group that developed the math skills checklist, which helped to secure the support of the math teachers
- the checklist itself was a key facilitator in the project's effectiveness
- documenting the process through detailed guides allows the staff to keep the project alive and well despite staff turnover
- teachers, as well as students, benefited from the integrated approach.

Corvallis hopes to continue using the peer-inservice model in other areas such as English and business communications.

GREAT OAKS JOINT VOCATIONAL SCHOOL DISTRICT, 3254 E. Kemper Rd., Cincinnati, Ohio 45241. *Contact:* Clifford A. Migal, associate superintendent.

In 1979, Great Oaks funded a massive employer study. The results showed that employers wanted to hire graduates who were more flexible, more capable of making lateral career changes, and more capable of moving up the career ladder. They also wanted entry-level employees with better skills in math, writing, and learning how to learn.

In 1980, Great Oaks began working with local business and industry to reevaluate the competencies required for individuals to succeed in an occupation in a

changing economy. After a two-year review process, the consensus was that skills in math, communications, and organization should be strengthened within each occupational area. It was also agreed that these skills should be taught by subject-matter specialists and integrated and correlated with the occupational field of study.

Accordingly, Great Oaks initiated a limited experimental program in one center in 1983 involving five vocational programs that required varying levels of math and science. The 10 teachers involved were selected because of their teaching skill, their openness to change, and their persistence. With the success of the experimental effort, the program was implemented throughout the district in the 1983-84 school year.

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First, make a commitment to involve both the people affected by the program and those whose support is needed — an involvement that should continue throughout the planning, implementation, and evaluation stages and that must be real and substantive.

Second, assess the current situation in relation to the proposed integrated program. At Sandy High, this assessment process included a number of activities:

- Key staff members were polled on such questions as: What science and vocational courses could be combined into a single integrated program? How would such a program be structured? How would teachers be selected? Results from these inquiries were tallied and used in the decision making. It was a consensus that since the school had access to a district-owned nature site, the most compatible vocational areas to ally with science were agriculture, forestry, and metals; in other words, an environmental science program.
- The science and vocational courses that were related to the areas being integrated were identified, and selected teachers from those courses were brought together to brainstorm the question, "What is taught in vocational education courses, especially those named above, that is also taught in science courses?" The broad topics identified were then analyzed using a given method and format. For each topic that was getting "double coverage," teachers determined the class in which it would be taught under an integrated plan, the teaching strategy to be used, the way in which students would demonstrate their learning, and the resources required. An analysis of "Population" is shown in Figure 1.
- A student questionnaire was circulated among the classes identified as components of the project. Students were asked why they enrolled, what they hoped to learn, what occupation they intended to pursue, and so forth. Based on the responses, about a dozen activities were given special prominence in the subsequent program writing.

Third, choose goals and objectives in the selected subjects and place them together with their companion tasks. Restrict the major objectives to a manageable number and base them on course goals the school already has in place. The goals identified at this point should be specific and limited.

Fourth, synchronize the goals and objectives. Review all the information you have gathered and all the relevant sources you have identified, and then, using a grid or some other organizer, put all the common pieces together into an integrated curriculum. In the grid used at Sandy High, the course objectives, science concepts, or student tasks related to a particular student project/goal are listed in the left column. To the right is a column for each vocational class and each science class involved in the integrated program. For each of the elements listed on the left, the extent to which each of the classes contribute is indicated by placing the code "I" (introduced), "T" (taught), or "R" (reinforced) in the "class" columns on the right. Thus, elements common to both academic and vocational courses can all be portrayed on one page. Figure 2 illustrates this grid in use with the topic "Population" as a sequel to Figure 1.

Fifth, once the grids are completed for each goal and element, determine the program length, needed

Figure 1

COMPLETED TOPIC INTEGRATION ANALYSIS

TOPIC: Population

SCIENCE CLASS	VOCATIONAL CLASS
Taught in: Biology/Environmental Science	Taught in: Agriculture II
Teaching Strategy: The instructor will lead a discussion of population. He will ask students to define the term and write responses on the chalkboard. After a "consensus" definition has been derived, discussion will focus on density, control factors, and interaction of species.	Teaching Strategy: The instructor will physically demonstrate the process of evaluating destructive insects in alfalfa. He will discuss each step and clarify all questions. He will then show students how to use an insect sweep.
Demonstration of Student Knowledge: Students will explore specific sites using the field collecting procedures defined by the instructor, and identify specific populations. In a written report, students will relate the populations to biotic and abiotic factors.	Demonstration of Student Knowledge: Students will use the insect sweep to collect injurious insects in an alfalfa field. A record will be compiled of the insects found. Specimens will be examined.
Resources: Line transect, hoop transect, written methods of random sampling, scat boards, netting, processes of live trapping.	Resources: Insect sweep.

materials, target population, and credit to be awarded. In Sandy High's case, 2 units of elective credit are awarded for the successful completion of Environmental Science toward the 24 units required for graduation.

Finally, build program evaluation into the process from the beginning. Make sure that both sets of objectives — in this case, science concepts and vocational skills — are reviewed with equal intensity.

A Few Reminders

Those practices associated with productive administrative leadership in other sectors of a high school's instructional program will be equally valuable in promoting the integration of vocational and academic studies. Nonetheless, it seems worthwhile to reiterate some generalizations that are especially relevant.

1. *Identify existing practices and efforts within the school that can be built on in trying to achieve a closer working relationship between academic and vocational staff members.* Many of these contacts will be ephemeral and seem minor, but don't be hasty in concluding that they are not influential in forming faculty opinion. These may be one-time activities, such as a conference of a student's academic and vocational teachers called by his or her adviser to discuss his or her attendance problems; or a regular course event, such as a field trip by a general science class to a school shop to see various industrial applications of levers; or membership on an all-faculty committee to review some proposed schedule changes.

2. *Don't assume that a significant degree of integration is impossible without huge amounts of additional funding.* The availability of adequate financial resources certainly can facilitate making and operating a curriculum revision of the kind discussed here, but much can be done by building on existing resources. Schools can restructure rather than rewrite their present curricula; available materials can be adapted; parts of the big idea can be put in place rather than waiting until the federal or foundation grant comes through. (And there are times when a bits-and-pieces beginning is the more comfortable and encouraging route to that big idea.)

3. *Identify any state and local requirements that will affect the feasibility of your integration hopes and plans.* State certification requirements control what teachers can be asked to teach. Local and state mandates concerning minimum time for recognized vocational courses must be taken into account. There are gradua-

Figure 2

STUDENT/PROJECT GOALS: The goal for which items below pertain would be written here.

I = Introduce (i.e., to bring topic or concept into use; to initiate discussion)

T = Teach (i.e., to provide systematic, formal instruction)

R = Reinforce (i.e., to strengthen instruction; to make the instruction more compelling)

	INTEGRATED COURSES												
	VOCATIONAL CLASSES						SCIENCE CLASSES						
	Intro to Agriculture/Hort.	Forestry I & II	Wood I & II	Drafting I & II	Metals I & II	Unified Science I & II	Biology	Chemistry	Botany	Zoology	Physics	Environmental Science	Topic Integration Analysis
1. *Concepts*													
(a) Interaction (from *A Framework for Science Programs*)	I	IT								ITR		ITR	
2. *Objectives*													
(a) Students will be able to define population.	ITR	I				ITR							3*
3. *Tasks* (learning activities)													
(a) Site Selection	R	R		ITR			R		R	R		IT	
(b) Trail Design	R	TR		ITR			R		R	R		IT	
4. *Related Jobs*													
(a) Environmental Analyst	ITR	ITR	R	R		R	ITR	R	ITR	TR	R	ITR	
(b) Geographer	TR	TR		TR		R	TR		R	R	R	ITR	

*3 This identifier number refers to a previously brainstormed activity (see Figure 1) which RELATES to the objective

tion requirements to satisfy — or to change. And the view that the state department of education takes of the proper nature and function of vocational education must be recognized.

4. *One key to the successful implementation of a substantial curriculum change is continued administrative attention to and support of the effort.* The implementation of an integrated vocational/academic program involves major changes, structurally and attitudinally, and requires a prolonged period of staff effort. If the staff members are expected to maintain their motivation throughout that period, administrative commitment must be continuing and explicit. The staff members must feel that the administration is aware of the progress being made and that they clearly appreciate that progress.

In other words, if you as an administrator want to see an effectively integrated academic/vocational program come to life in your school, don't think you can just plant the seed and then move on to other things. Whatever form it takes, developing that program is a demanding professional task that merits full "front office" support in every form.

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KUDOS

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